United States Environmental Protection Agency | Office of Water 4601 | EPA 811-F-95-004j- T October 1995

National Primary Drinking Water Regulations

Dichloromethane

Chemical/ Physical Properties

CAS Number: 75-09-2

Color/ Form/Odor:
A colorless liquid with a sweet, pleasant odor like chloroform.

M.P.: N/A **B.P.:** 39.75° C

Vapor Pressure: 400 mm Hg at 24.1° C

Octanol/Water Partition (Kow):
Log Kow = 1.25

Density/Spec. Grav.: N/A

Solubility: N/A

Soil sorption coefficient:
Log Koc estimated at 1.68; High to moderate mobility in soil

Odor/Taste Thresholds: N/A

Bioconcentration Factor:
BCF = 5 (est.); not expected to bioconcentrate in aquatic organisms.

Henry's Law Coefficient:
N/A; Reportedly high. Moderate evaporation from water.

Trade Names/Synonyms:
DCM, Methylene chloride

Drinking Water Standards

MCLG: zero

MCL: 0.005 mg/L

HAL(child): 1 day: 10 mg/L
10-day: 2 mg/L

Health Effects Summary

Acute: EPA has found dichloromethane to potentially cause the following health effects from acute exposures at levels above the MCL: neurological (encephalosis) and blood cell damage.

Drinking water levels which are considered "safe" for short-term exposures: For a 10-kg (22 lb.) child consuming 1 liter of water per day: a one-day exposure to 10 mg/L or a ten-day exposure to 2 mg/L.

Chronic: Dichloromethane has the potential to cause the following health effects from long-term exposures at levels above the MCL: liver damage

Cancer: There is some evidence that dichloromethane may have the potential to cause cancer from a lifetime exposure at levels above the MCL.

Usage Patterns

Production of DCM has been decreasing: from a high of 561 million lbs. in 1986, to 410 million lbs in 1993 (projected 1993 data). In 1988, industries consumed DCM for various uses as follows: paint stripper, 28%; aerosols, 18%; exports, 15%; chemical processing, 11%; urethane foam blowing agent, 9%; metal degreasing, 8%; electronics, 7%; other, 4%.

The greatest use of DCM is as a paint remover. Other uses include: solvent and cleaning agent in chemical manufacture, textiles, electronics, metals and plastics, pesticides industries; blowing and cleaning agent in the urethane foam industry; fumigant for strawberries and grains, and as degreener for citrus fruits; in pharmaceu-

Toxic Release Inventory - Releases to Water and Land: 1987 to 1993

	Water	Land
TOTALS (in pounds)	1,544,694	556,830
Top Ten States*		
CT	940,158	0
NY	58,400	155,755
GA	166,700	0
NJ	138,302	2,721
WI	0	139,920
SC	20,860	52,810
MI	39,575	32,900
KS	0	33,489
MO	0	27,295
TX	15,910	823
Major Industries*		
Medicinals, botanicals	1,106,858	0
Photographic supplies	58,400	155,755
Misc Indust. organics	141,942	53,741
Custom plastics, resins	0	139,920
Pharmaceuticals	37,575	0
Potato/corn chips&snacks	2,000	32,900
Air conditioning/heating	0	33,489
Steel pipe, tubing	0	27,295

* Water/Land totals only include facilities with releases greater than a certain amount - usually 1000 to 10,000 lbs.

ticals and as an anesthetic; in extraction of caffeine, cocoa, fats, spices and beer hops; as a heat transfer agent in refrigeration products.

Release Patterns

Dichloromethane is released to the air from its use as an aerosol propellant, paint remover, metal degreaser and a urethane foam blowing agent. It is released in wastewater primarily from the following industries: Paint and ink, aluminum forming, coal mining, photographic equipment and supplies, pharmaceutical, organic chemical/plastics, rubber processing, foundries and laundries.

In a 1978 report, release of dichloromethane to the land totalled 61.6 million lbs, with a breakdown for its various uses as follows: production, 22,000 lbs; paint removers, 19.4 million lbs.; metal degreasing, 13.4 million lbs; aerosols, 8.4 million lbs.; foam blowing agent, 2.6 million lbs.; pharmaceutical solvent, 4.8 million lbs.; miscellaneous solvent uses, 13 million lbs. Release of dichloromethane to water totalled 8.1 million lbs., with breakdown: production, 66,000 to 132,000 lbs.; paint removers, 3.1 million lbs.; metal degreasing, 2.2 million lbs.; pharmaceutical solvent, 1 million lbs.; miscellaneous solvent uses, 1.7 million lbs.

Dichloromethane is also formed during the chlorination of water.

From 1987 to 1993, according to EPA's Toxic Chemical Release Inventory, DCM releases to land and water totalled over 2.1 million lbs., of which about 75 % percent was to water. These releases were primarily from medicinals and botanicals industries which use DCM as a solvent and extractive. The largest releases occurred in Connecticut and New York.

Environmental Fate

Most of the dichloromethane will be released to the atmosphere where it will degrade by reaction with photochemically produced hydroxyl radicals with a half-life of a few months. It will be subject to direct photolysis.

Releases to water will primarily be removed by evaporation. Half-lives for the evaporation from water of 3-5.6 hours have been determined at moderate mixing conditions. When released into a river, dichloromethane levels were non-detectable 3-15 miles from the source. Biodegradation is possible in natural waters but will probably be very slow compared with evaporation. Dichloromethane is reported to completely biodegrade under aerobic conditions with sewage seed or activated sludge between 6 hours to 7 days. It will not be expected to significantly adsorb to sediment. Hydrolysis is not an important process under normal environmental conditions, with a minimum reported half-life for hydrolysis of approximately 18 months.

Releases to soil will evaporate rapidly from near-surface soil and partially leach into groundwater where its fate is unknown. Little work has been done on the adsorption of dichloromethane to soil. It is adsorbed strongly to peat moss, less strongly to clay, only slightly to dolomite limestone, and not at all to sand. A log Koc of 1.68 can be calculated from a reported log Kom of 1.44.

Although experimental data are lacking, dichloromethane would not be expected to bioconcentrate due to its low octanol/water partition coefficient (log Kow is 1.25), from which an estimated BCF of 5 can be estimated using recommended regression equation.

The major route of human exposure is from air, which can be high near sources of emission, and contaminated drinking water.

Other Regulatory Information

Monitoring:

For Ground/Surface Water Sources:

Initial Frequency- 4 quarterly samples every 3 years

Repeat Frequency- Annually after 1 year of no detection

Triggers - Return to Initial Freq. if detect at > 0.0005 mg/L

Analysis:

Reference Source	Method Numbers
EPA 600/4-88-039	502.2; 524.2

Treatment:

Best Available Technologies

Granular Activated Charcoal and Packed Tower Aeration

For Additional Information:

- EPA can provide further regulatory and other general information:
  - EPA Safe Drinking Water Hotline - 800/426-4791
- Other sources of toxicological and environmental fate data include:
  - Toxic Substance Control Act Information Line - 202/554-1404
  - Toxics Release Inventory, National Library of Medicine - 301/496-6531
  - Agency for Toxic Substances and Disease Registry - 404/639-6000